A TOUR AROUND THE SHOWROOM: TAKING A SPIN WITH NEW HMT-WPC DEVELOPMENTS

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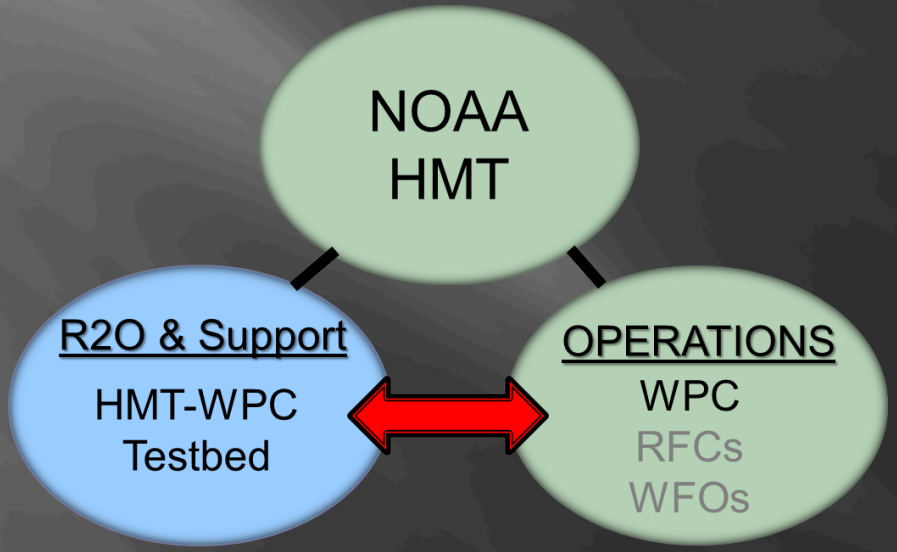
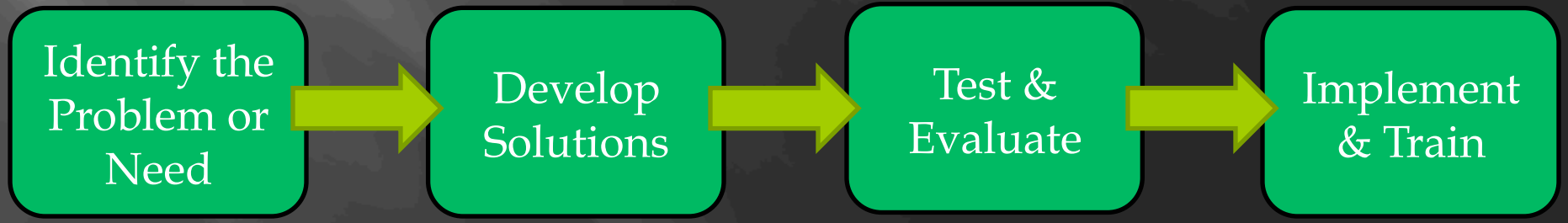
HMT-WPC: What do we do?

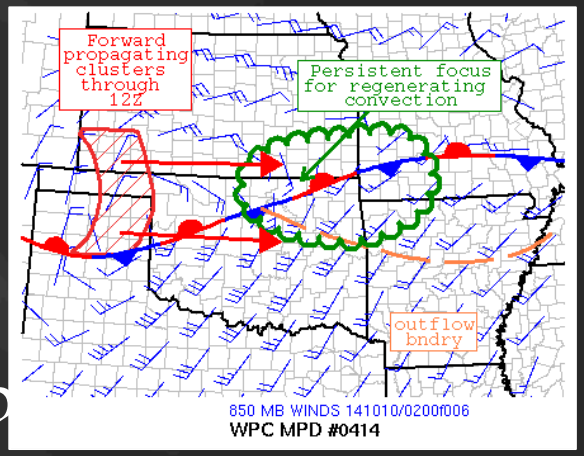
Accelerate the transfer of scientific and technological innovations ***into operations to enhance WPC products and services.***





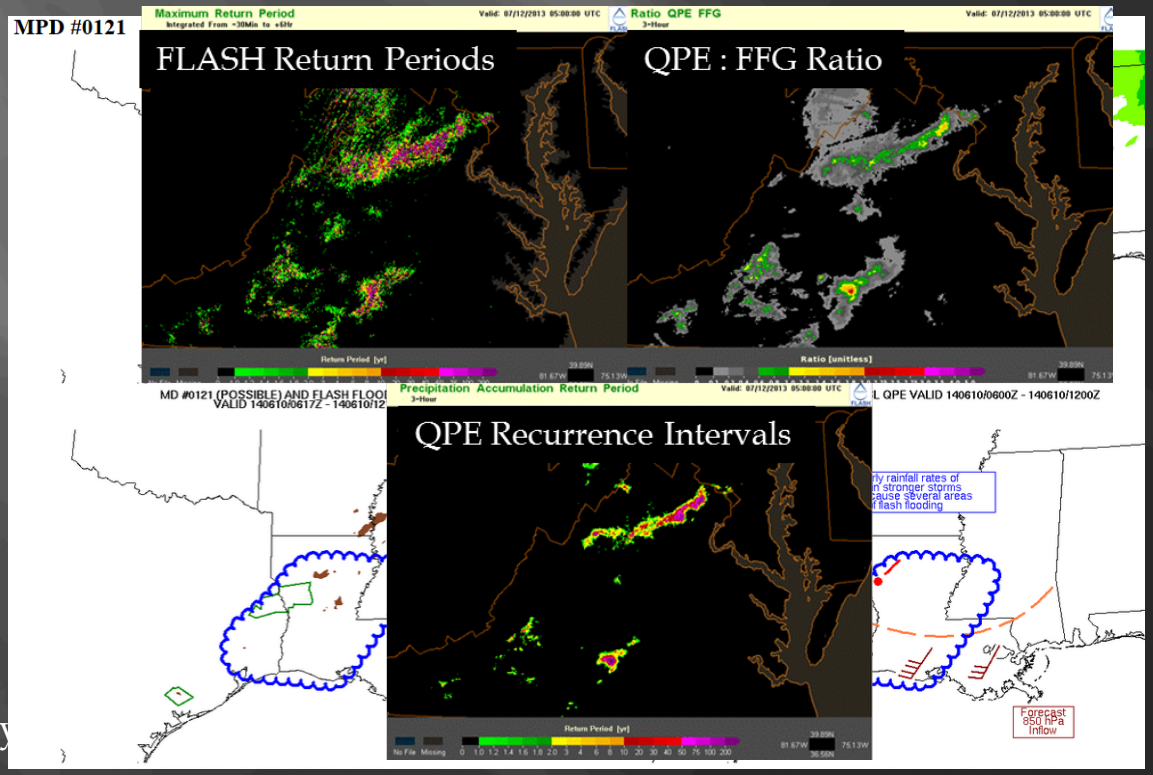
The Need for Flash Flood Verification

- There is no consistent CONUS database of flash flood observations
- Mesoscale Precipitation Discussion (MPD)
  - Began April, 2013 (prototype 2012)
  - Event driven
  - Highlight regions where heavy rainfall may lead to flash flooding (1-6 hrs)
- Flash Flood and Intense Rainfall Exp
  - Experimental Flash Flood forecasts
  - Development/evaluation of new forecast guidance and tools



The Need for Flash Flood Verification

- There is no consistent CONUS database of flash flood observations
- Proper verification is very difficult…..



FLASH: JJ Gourley

The Need for Flash Flood Verification

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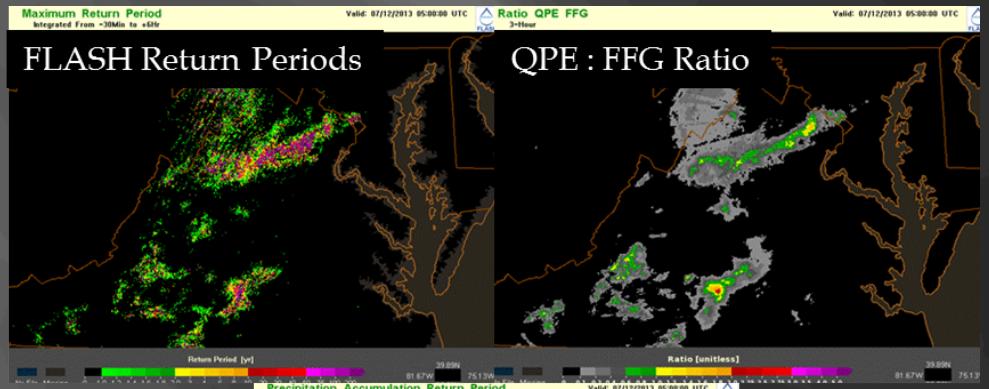
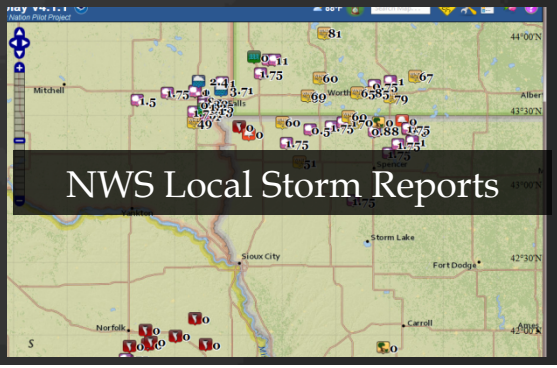
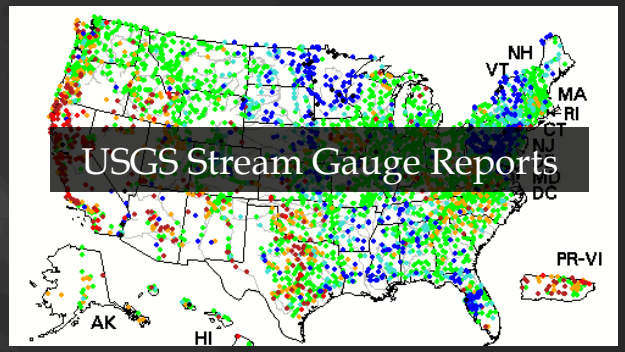


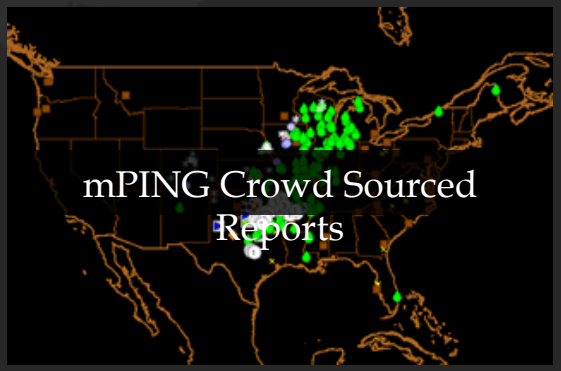
Courtesy of Brian Cosgrove, OHD

Three-Pronged Real-time Postgres Hydrologic Verification Database

Postgres Component Database	Strengths	Weaknesses
NWS Local Storm Reports	-Official, accepted NWS product -Relatively dense coverage -Descriptive language	-Subjective description -Coverage depends on population density and time of day -Location, time, categorization errors
USGS Stream Gauge Observations	-Objective measure of stream condition (flow) -Official, accepted USGS stream flow data -Large number of gauges	-Subset of gauges with actual flood stage limited -Differentiating flood/flash flood is subjective -Regulation complications -Coverage can be sparse, limited to rivers
mPING Crowd-Sourced Reports	-Potential for dense reports	-Subjective -Dependent on participation -Quality control issues given non-professional source -Differentiating flood/flash flood is not possible -Currently sparse coverage





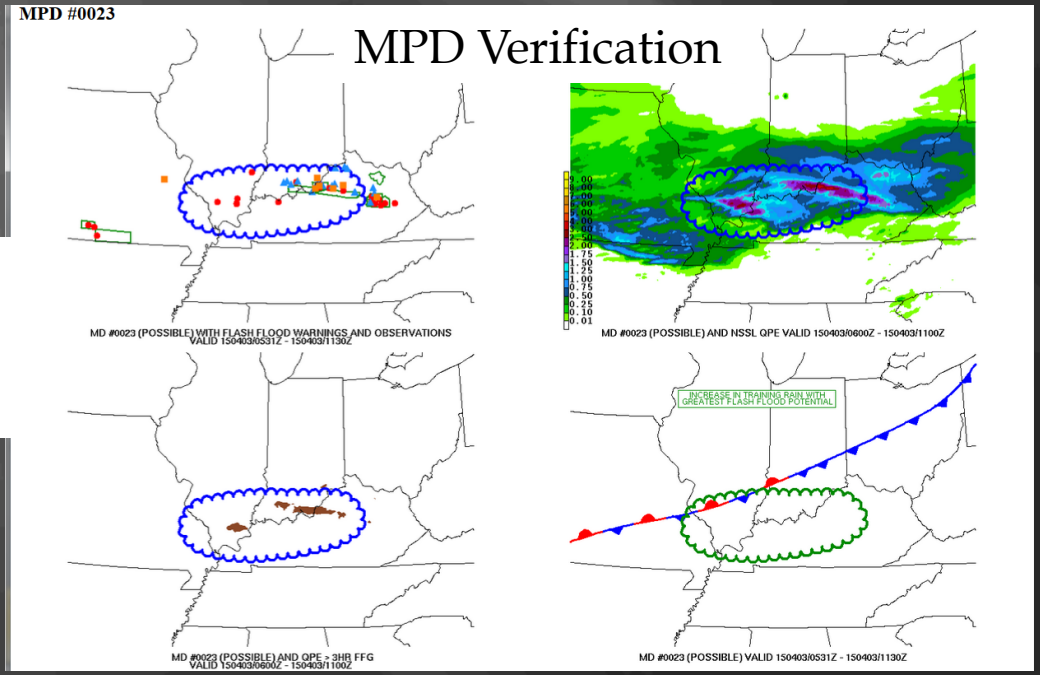


USGS Stream Gauges:

1) Flood stage exceeded? 2 year recurrence interval?
2) 'Sharp' rate of rise?
3) Basin <2000 km$^{2?}$

Three-Pronged Real-time Postgres Hydrologic Verification Database

- Database updated every 15 mins
- Creates archive; can request data for user-defined time periods
- Allowed for advancements in FF verification:



Red – flash flood LSR
Blue – flood LSR
Orange – mPING
Magenta - USGS

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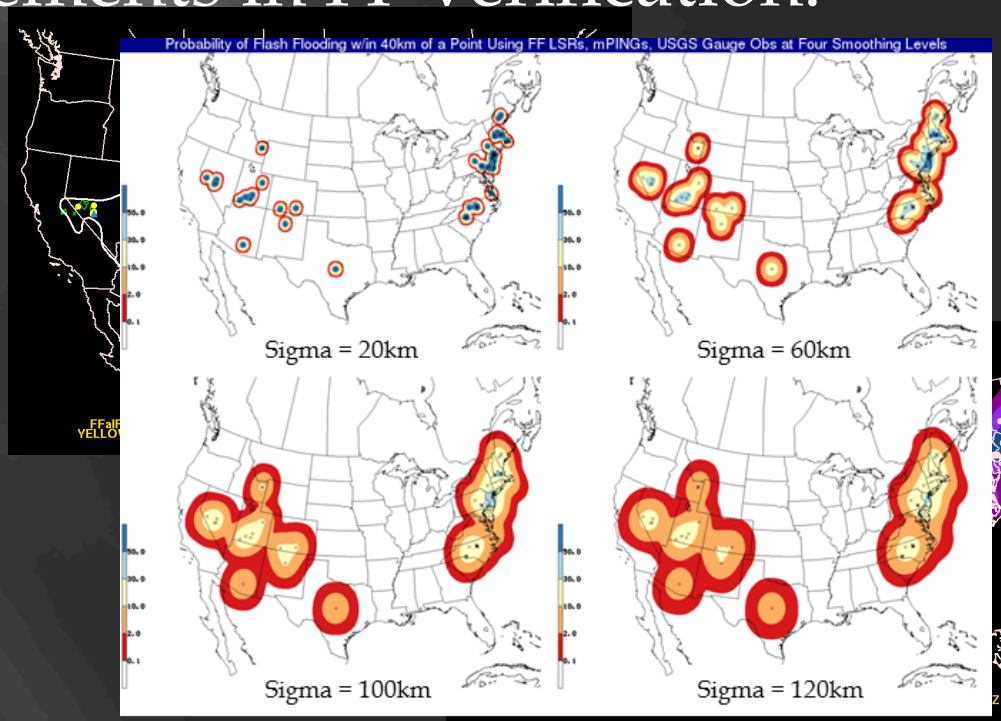
- Allowed for advancements in FF verification:

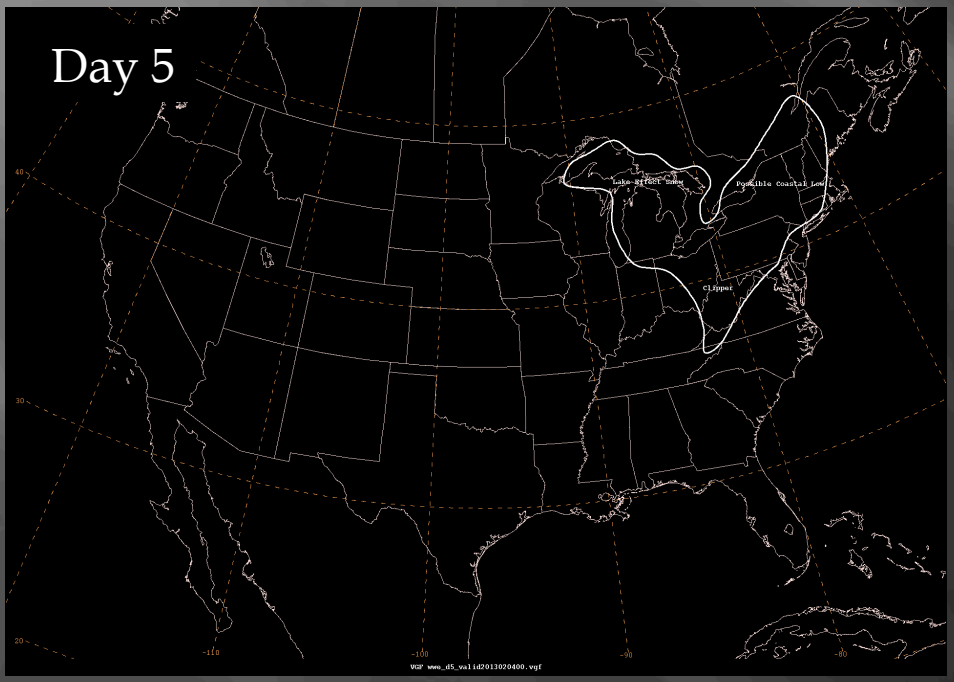
"Practically Perfect" Analysis Technique:

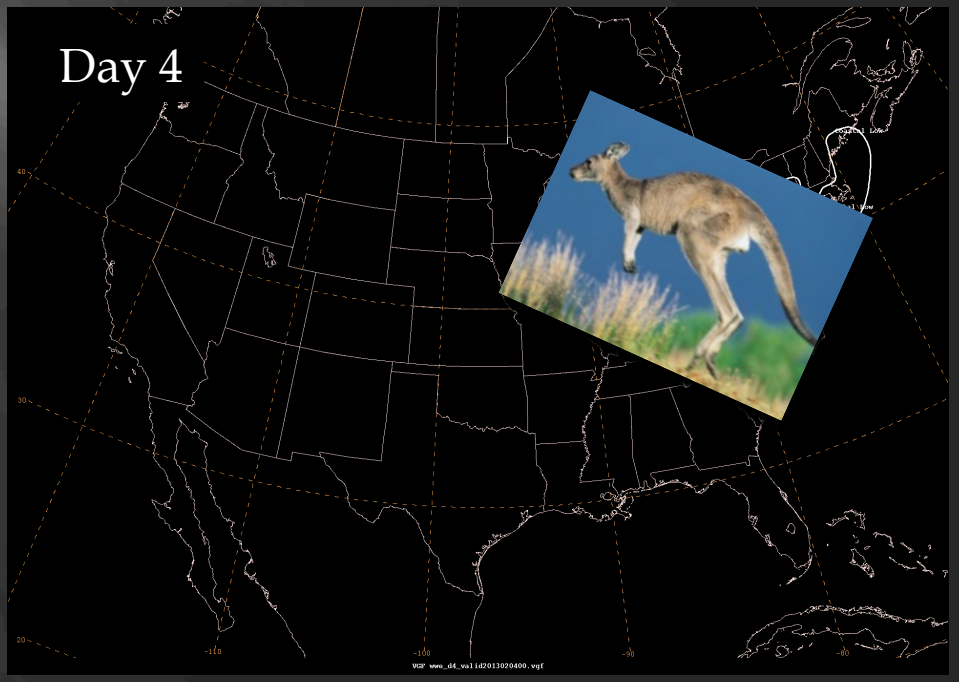
- Converts point observations into probabilistic forecast areas via Gaussian weighted function
- Consider including additional data:
  - Heavy rain LSRs
  - Flash flood warnings
  - QPE
- Consider weighting datasets differently



Expansion of Winter Weather Guidance into Days 4-7

- 2013 Winter Weather Experiment: *Can we accurately predict winter weather at days 4 & 5?*





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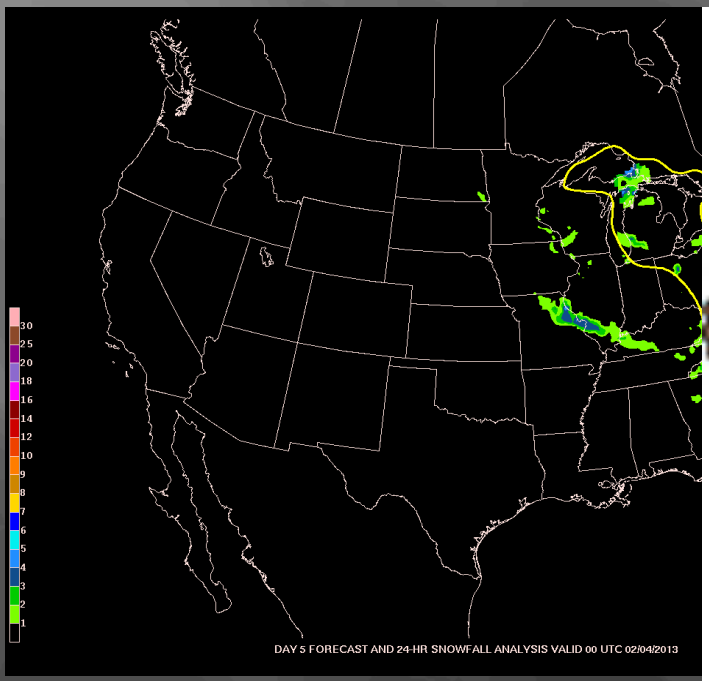
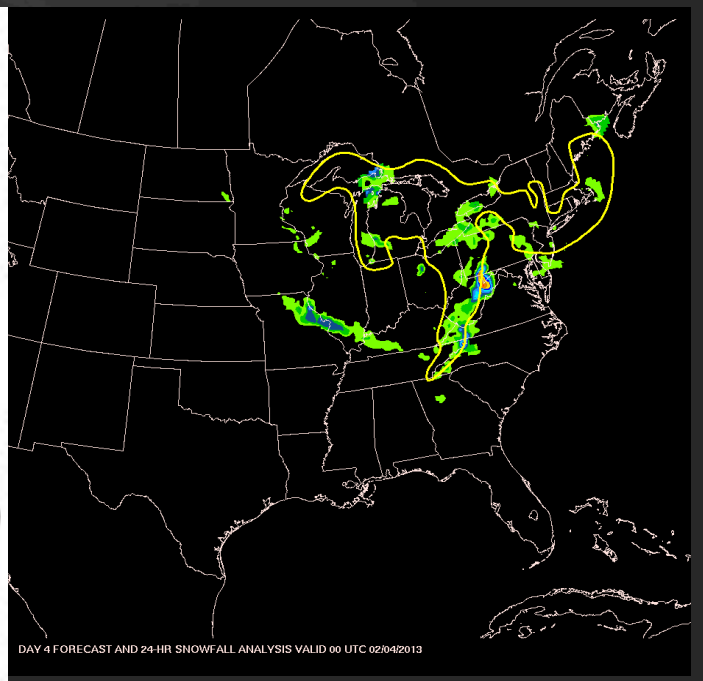
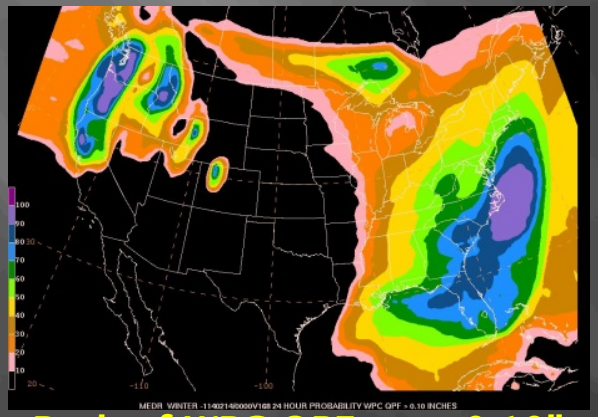


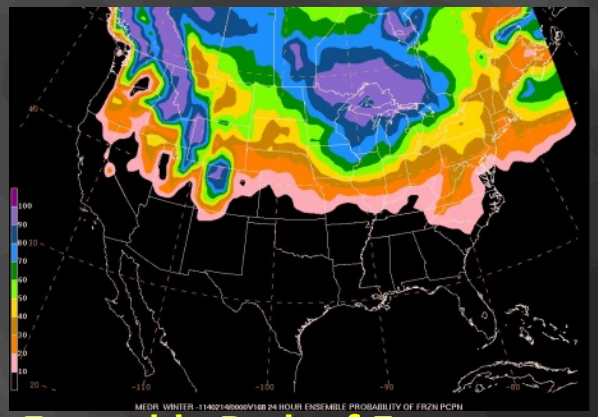


Expansion of Winter Weather Guidance into Days 4-7 (2014)

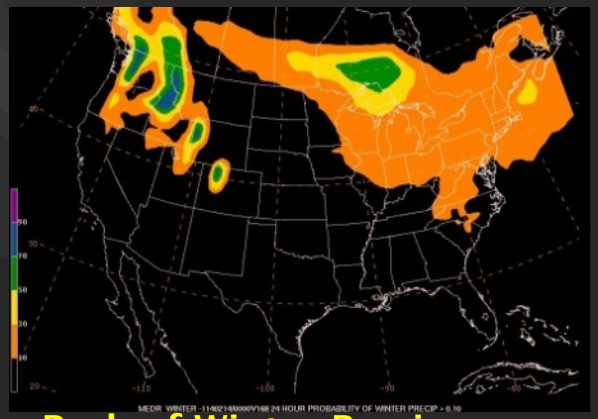
- Day 4-7 Probability of >.1" of frozen precipitation
  - 24 hour forecasts: day 4, 5, 6 and 7
- Develop Guidance:
  - *Disaggregate WPC Day 4-5, Day 6-7 QPF*
  - *Use **GEFS** and **ECENS** to generate CDF (70 members) to extract probabilities of >.1" QPF*
  - *Combine with ensemble probability of frozen precipitation from **GEFS** and **ECENS***



Prob of WPC QPF >= 0.10"



Ensemble Prob of Fzn Precip



Prob of Winter Precip > 0.10"

Courtesy of Mike Bodner, WPC

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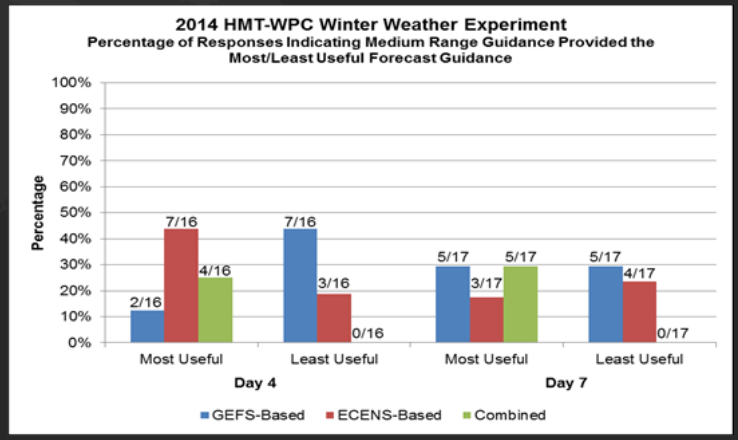
  - *Combine with ensemble probability of frozen precipitation from **GEFS** and **ECENS***
- Tested in 2014 Winter Weather Experiment

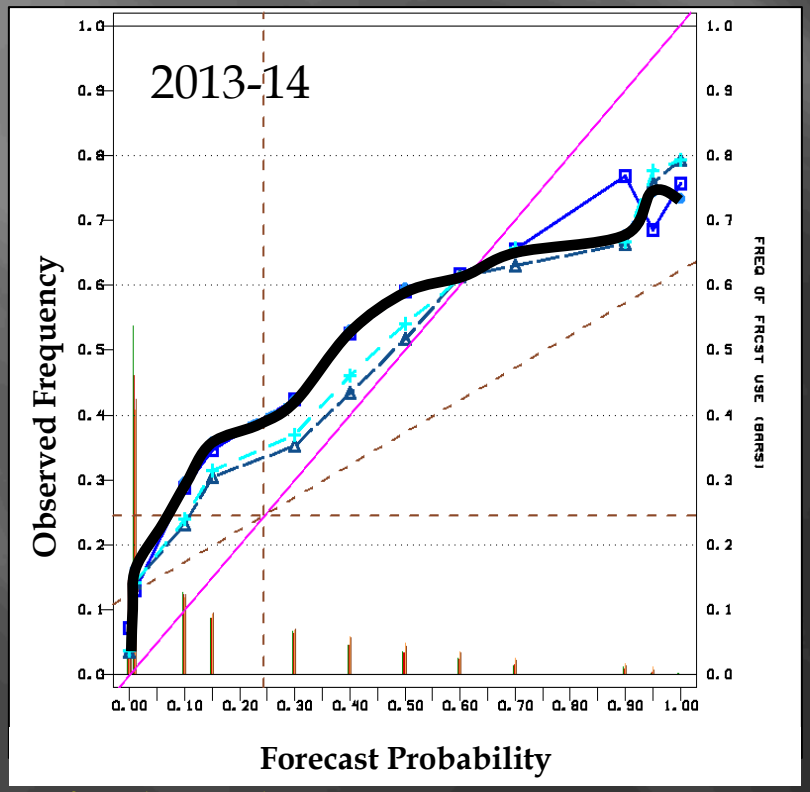
Results were promising…but not perfect:

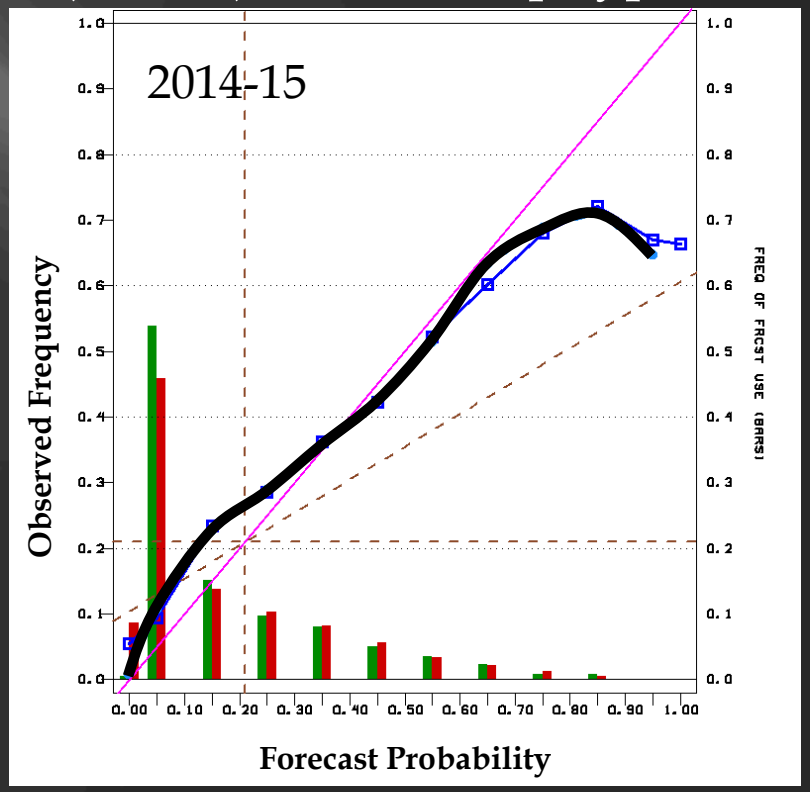
1) Predictibility diminishes toward day 7 (duh…)
2) Multi-ensemble approach is most effective
   - Guidance was under-dispersed
3) GEFS p-type was problematic
   - Conditional on precip caused problems
4) What else can be done?
   - Different thresholds? Freezing rain?



Expansion of Winter Weather Guidance into Days 4-7 (2015)

- Implemented Day 4-7 Winter Weather prototype (WFOs)
  - Positive feedback; calls for additional thresholds
- Improve probabilistic guidance:
  - Increase ensemble to 90 members (CMCE), consistent p-type





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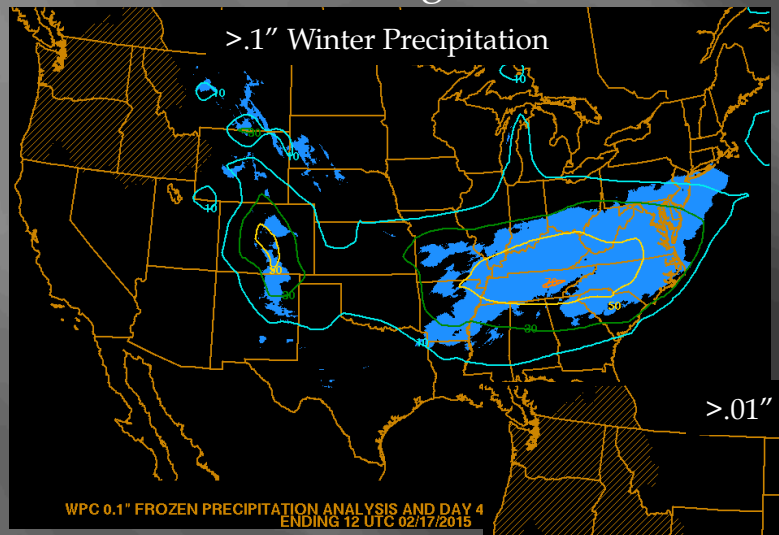
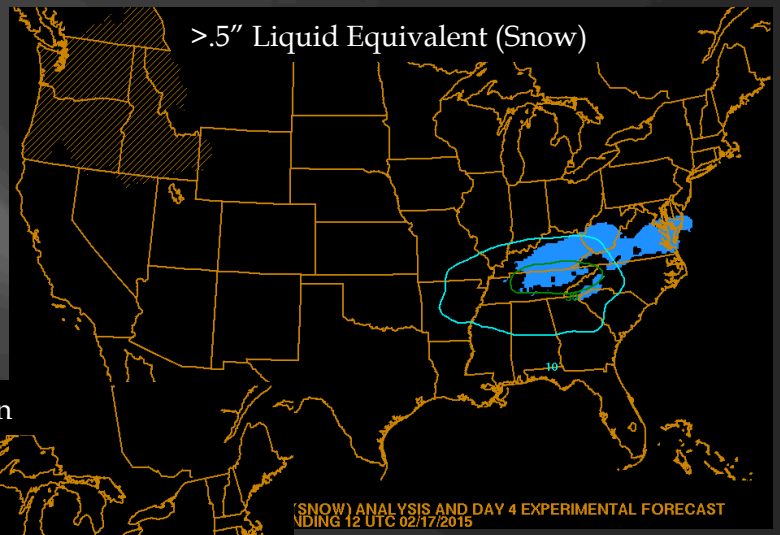
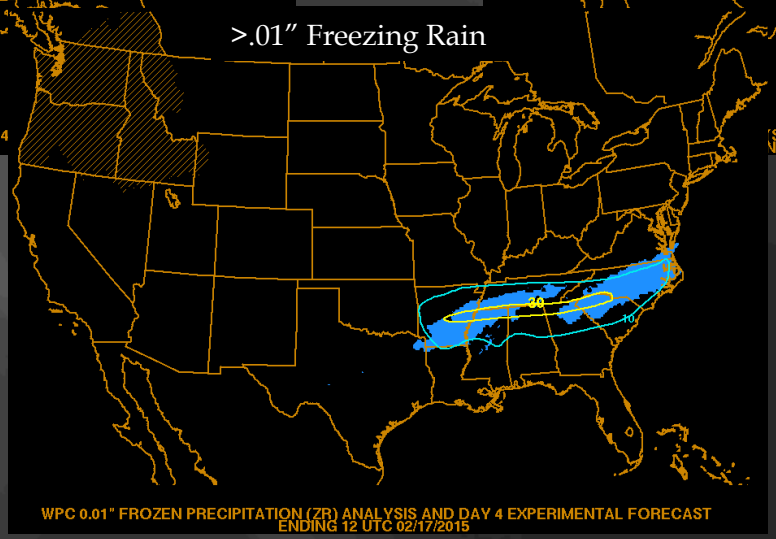
Expansion of Winter Weather Guidance into Days 4-7 (2015)

- 2015 Winter Weather Experiment:
  - >.5″ liquid equivalent in the form of snow
  - > .01″ freezing rain







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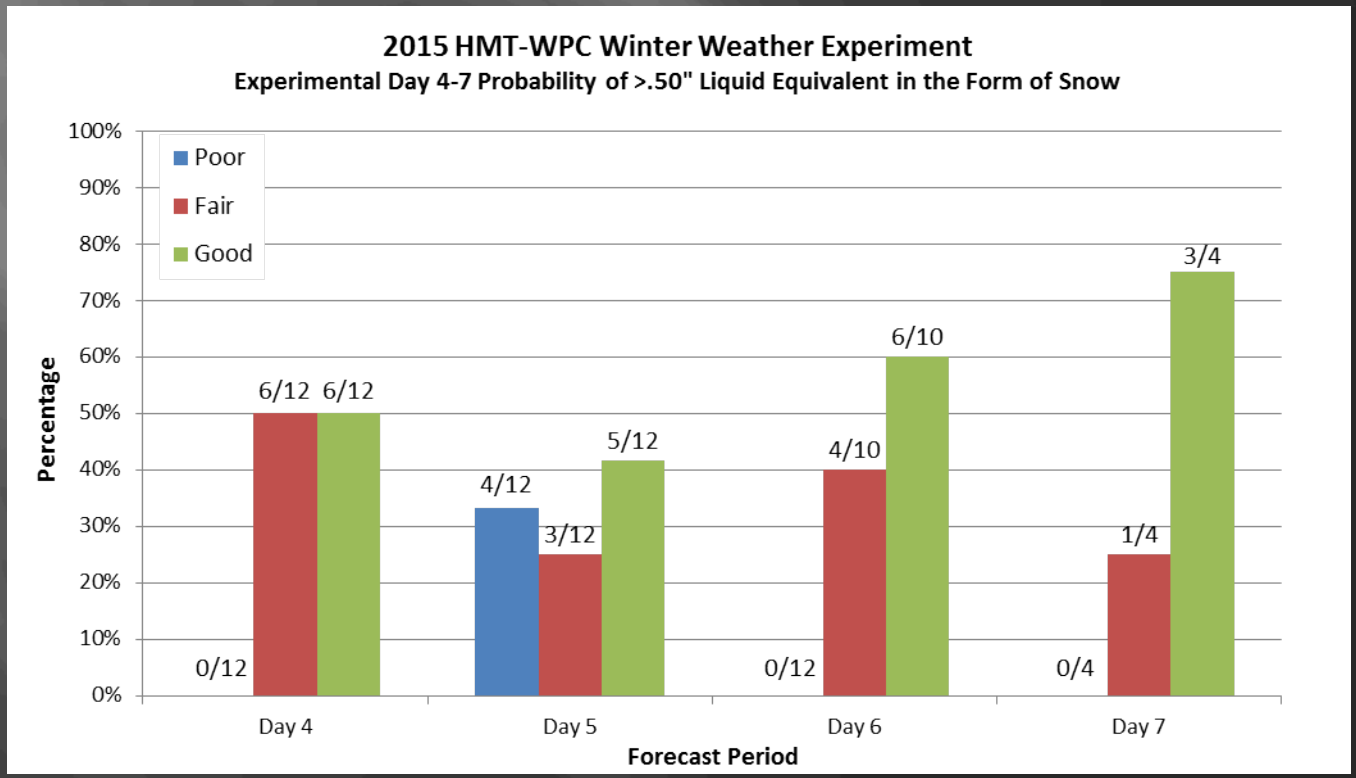

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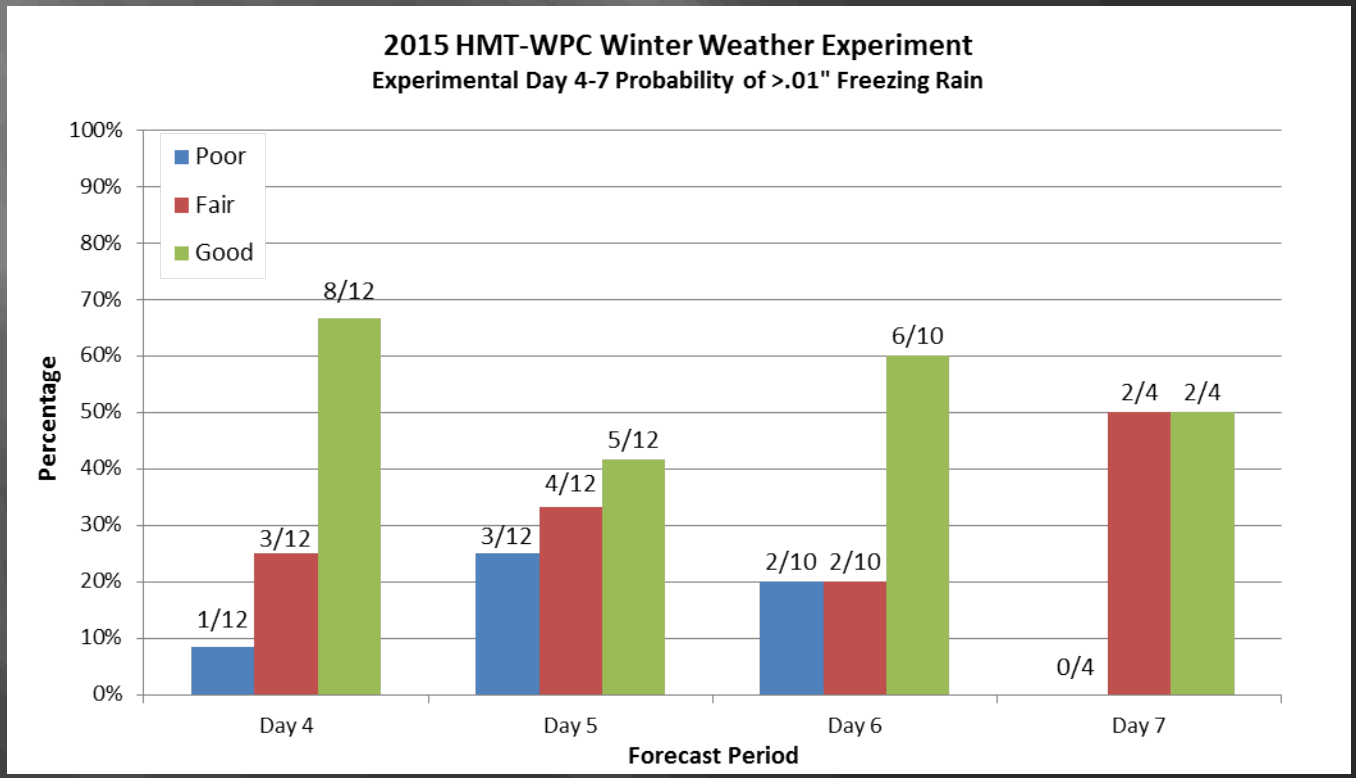

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  - >.5" liquid equivalent in the form of snow
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- Results were promising…….
- What's next??
  - Plans go to 'experimental' with *Probability >.1" Frozen Precipitation* product next winter
  - Continue development of additional thresholds
  - Continue development of snow (liquid equivalent) and freezing rain probabilistic products
  - Prototype??